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There is no second ridge on the outer (trochlear) side of it. The same condyle terminates abruptly posteriorly on the superior face of the shaft. Width of condyles in No. 1, eleven lines ; in No. 2, thirteen lines ; vertical diameter, inner condyle, eleven lines (No. 1) ; transverse diameter shaft above, eight lines.

The proximal articular surfaces of the proximal wing phalanges are deeply concave, the inner protected by an elevated margin behind ; that of the outer, much lower. They are separated chiefly by a deep emargination, but on their short adjacent portions by a low ridge. The process for ligamentous insertion is well developed. The distal extremity is slightly widened, and its articular surface is wedge shaped with very convex base. Its surface is slightly concave in both directions and without median ridge. The margin of the shaft terminates in a short tuberosity bearing articular surface. Transverse diameter, sixteen lines. Length of shaft preserved, but incomplete, nine inches, one line.

This species is about the size of the Pterodactyle found by Professor Marsh in the same region,* and probably belongs to the same genus, and possibly to the same species. This, however, cannot be definitely ascertained as his species is imperfectly described, all the characters adduced except the measurement being generic. The name given by Professor Marsh has also been previously used, both in this genus and in *Pterodactylus*, and must therefore be given up.

Remains of the two *Ornithochiri* above described are not rare in the yellow chalk of the Niobrara Group, and those obtained were mostly from different parts of the course of the bluffs of Butte Creek.

A DESCRIPTION OF THE GENUS PROTOSTEGA, A FORM OF EXTINCT TESTUDINATA.

By Edward D. Cope.

(*Read before the American Philosophical Society, March 1st,* 1872.)

The present article introduces to the system a new form of Testudinata of a character not heretofore found in a fossil condition. Its affinities will be more fully discussed at the end of the description, but they appear to belong to the *Sphargididæ.* This family is represented, in our present knowledge, by but one genus and one species of the recent seas. It is one of the most generalized, or in special characters, the most aberrant of the order of the tortoises, and the discovery of an extinct ally, even as far down in the series as the cretaceous period, is not surprising.

The remains preserved belong to a single individual, and include many portions of the cranium, five vertebræ more or less incomplete, the scapular arches of both sides with the coracoid bones ; both humeri perfect, with nine phalanges, ten ribs, one vertebral (?), and ten marginal bones ; parts or wholes of four large lateral (?) dermal bones, with five distinct bones of unknown reference. There are also some slender curved bones which probably pertain to the plastron.

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*See Am. Jour. Sci. Arts, June, 1871.

As the bones were exposed by excavations in the yellow cretaceous chalk, sketches of their positions and relations were made, which aid materially in the restoration of the animal. The upper layer of bones were those of most irregular form, as cranial and limb bones. Mingled with these, but often beneath them, were the ribs, while underlying all, were the large flat pieces here described as dermal. Adhering to the inferior surface of these was a layer of thin oyster shells with parallel striate surface, perhaps *Inocerami.* The ribs presented their heads upwards; so that taking all points into consideration, there is little doubt that the reptile was entombed on its back.

The texture of the bones is peculiar. There are nowhere to be seen medullary cavities, and the bone is spongy, but very finely so, the tubules at the largest being equal in diameter to an ordinary pin, and generally considerably smaller. They are arranged in concentric series. There is no thick dense layer of the bone as in other tortoises, but an extremely thin one, which is hard and sculptured on the surface with minute grooves or pits. The tissue of the bone is very fragile, and has a fracture like the mineral enclosing it. Many of the bones, especially those of the dermal skeleton, are extremely attenuated on the margins, being no thicker than writing paper.

There are twelve *marginal bones.* They are all characterized by their laminar form. The thinnest are those furthest removed from the middle of the sides. They consist of a single lamina slightly thickened within the margin, producing a slight convexity of the lower side. The proximal part of the bone is an extremely thin plate with radiating ossification, and consequently more or less serrate margin. It extends some distance over the extremity of the rib, whose apex is received into a half pit or acuminate groove with abrupt termination, about one-sixth the width of the bone from the margin.

In following the marginals to the middle of the side, the edge, as usual, increases in thickness. The lower side becomes more convex, and the upper slightly concave. The edge is acute, and a very open interior entering angle at the middle. The lateral extremities of the marginals are irregular, terminating in a double series of closely packed digitations, which terminate freely, and enter into no suture. The pit receiving the extremity of the rib approaches the margin, which now develops an inferior lamina of bone. This encloses the end of the rib, and thins out laterally in contact with the superior plate. At first the inner lamina is short; later it is almost as extensive as the outer part of the marginal plate, causing the double appearance when fractured. As the marginals thicken, a distinct inferior plane becomes distinguished, separated from the interior face by an obtuse angle. The upper face near the margin is more concave. In the thickest and inferior face is also somewhat concave, and the edge quite acute. The lateral extremities consist as before of packages of digitations which easily break out.

A single nearly bi-lateral bone of this series appear to be either nuchal or caudal, but as it has no sutural connection with any other it is not easy to determine which is. Its marginal length is much less than its transverse extent, which consists chiefly of a flat lamina. The marginal part is a little thickened and bi-laterally concave below, and correspondingly convex above. The margin is thin and acute. A few grooves radiate at a distance from the middle towards the margin. The lack of concave excavation of the margin would incline the balance in favor of the view that this bone is the caudal.

A very long gently curved bone is probably the marginal extending on one side of the nuchal. It is nearly twice as long as the others, and has an extensive and thin superior lamina. Its (?) anterior part is in one plane, but the margin soon thickens and displays a rather wide infero-external face. It appears to have had an inferior lamina on its posterior half, which made an angle with the face just described. An oval cavity included, looks as though designed for the apex of the rib.

The variation in the lengths of these marginal bones is noteworthy. I give measurements, premising that a few lines may be added to the extremities of some for lost digitations:

	M.
Length of long anterior (11 in.)	0.28
Width " " (some lost)	.135
Length of lateral with inferior face	.195
Width " (much lost)	.110
Length " with narrower inferior face	.206
Width " (much lost)	.115
Length of one with interior lamina	.14
Width " (some lost)	.086
Length of a thinner, no inferior plate	.193
Length still thinner, " "	.182
Width of " (broken)	.137
Length thinnest	.162
Width " (nearly complete)	.160
(?) Caudal length	.117
" width	.150

The shortness of the marginal with large interior lamina is noticeable. as also the same peculiarity in the caudal. As compared with marine turtles, difference is to be observed in every particular. Such are the lack of sutural union, the laminar character ; the great extent of the superior and distinctness of lower laminæ. There is no trace of epidermal sutures visible anywhere.

A single symmetrical plate appears to have belonged to the middle line of the back or nape. It was sub-triangular in outline, all the margins very thin, and with an obtuse keel extending on the middle line, on the posterior (or anterior) two-thirds to the apex. This ridge disappears in (?) front by a gradual expansion. The surface is marked by lines of minute pits and grooves, which radiate from the base at the (?) front of the ridge. Length, M. .135; width, .21.

The *lateral dermal bones* preserved, are two entire, and large parts of one or of two others. They have an irregular oval outline and are slightly dished on the inferior surface or that next the ribs. The upper surface is more convex longitudinally, from the thickening of the bone. The margins are irregular from the projection of many digitations. Some of these are broad and flat, others are narrow. They are frequently two deep, and the fissures separating them occasionally extend far towards the middle of the bone. The convexity assumes the form of a low ridge towards one end of the bone. At the point where this reaches the margin, the latter is in all the four plates, thickened, and composed of several layers of packed osseous radii. When found, the ribs laid across these shields; one of them occupying the position of a radius to one of them. These shields are much larger than the marginal bones.

	M.
Length "No. 10" (21 inches)	0.535
Width " (broken)	.400
Thickness at middle	.014
Length "No. 9"	.530
Width " (much broken)	.530
Thickness at the middle	.013

The lengths and breadths given are a little below the truth, owing to the loss of the exceedingly thin margin.

Turning to the endo-skeleton, the *vertebræ* deserve mention. There are more or less complete examples of five of these: in two, both centrum and neural arch; in two, neural arch; and in one, centrum, are preserved. These have been recognized chiefly by their neural arches, which are separate. They are in form something like an X, the extremities of the limbs carrying the zygapophysal surfaces. The only point of contact with the centrum is a wide process which stands beneath the anterior zygapophysis, and spreads out foot-like obliquely forwards and outwards, to beyond the line of its anterior margin. Its surface extends nowhere posterior to the surface of zygapophysis above it, but a little further inwards. Its outer margin rises ridge-like to the under side of the neural arch, and each one forming a semi-circle forms the boundary of the neural canal, and turning outwards forms the *inner* boundary of the posterior or down-looking zygapophyses. The space between these apophyses is roofed over, so as to produce a shallow zygantrum, which, however, only seems to roof over the deep emargination of the neural arch of the vertebra immediately following. The anterior zygapophyses are often broken away, so that the neurapophysial supports look like the missing pair, when the difficulty ensues that both pairs look downwards. The top of the neural arch is in two cases broad and flat; in two others there is an obtuse keel.

The centra apart from their arches are puzzling bodies, especially since in the present case they are somewhat flattened by pressure. They differ materially in size, one of them being twice the size of the others. The smaller ones are of the ball and socket type and have a deep longitudinal groove on each side. The thicker portion of the centrum forms the inferior boundary of this pit-groove, while a thinner portion, possibly a diapophysis limits it above. It is, however, thin, and had no great length. There is no sign of chevron bones and articulations, so that these vertebræ may have been cervical. Their bodies are, however, shorter and wider than in those vertebræ of any known tortoise. A groove on the upper surface represents the neural canal; while a flat portion on each side in front, supports the neurapophyses. The large centrum exhibits the superior groove, and antero-lateral platform for support of the neural arch. One end is cupped obliquely, while the other is nearly plane, with the same obliquity and a slightly raised margin. Its outline is sub-triangular. The lower side of this centrum possesses a short keel posteriorly. The sides exhibit no pit, but have a thin edge, which is concave behind the middle, and then turn outwards. I can see no articulation for a rib.

The forms and characters of these vertebræ resemble *Sphargis* more than anything yet described. Either the large or the small, or both must be referred to the dorsal region; in this case the concavity of one extremity is a new feature among tortoises, so far as known. The great freedom of the arch from the centrum is very peculiar, while it is probable that the articulations of the ribs were to the middle of the side of the body, and not to the adjacent parts of two bodies, and may have been (see below) to processes or diapophyses.

	M.
Length medium centrum	.037
Width “ “	.060
Length between margins of zygapophyses do.	.060
Width “ anterior “ “	.070
“ “ posterior “ “	.047
“ “ anterior basis of arch	.070
“ arch at middle	.028
Length “ “	.040
Width posterior zygapophyses, No. 2	.048
“ of arch	.025
Length “	.025
“ of anterior foot (oblique)	.02
Length centrum of large one	.06
Width “ “ “	.094
“ neural canal “ “	.017

Ten *ribs* were recovered. These are slender and rather flatter than in most reptiles, but without the peculiar form, characteristic of tortoises and turtles. They are most expanded proximally, the bone spreading into a lamina, from the tubercular region, extending laterally and proximally some distance beyond the head. The superior plane of this expansion is continuous with that of the rib, and is flat; the head of the rib therefore turns downwards and inwards from it, to join the vertebra. Now the extent of the inner part of the lamina is such that, were the head articulated to any of the centra discovered, the former would interfere or overlap. They may, therefore, have been articulated to diapophyses. The expansions are serrato-digitate on the margins, and exhibit radiating grooves and ridges in some places, on the superior aspect. The lengths of these ribs are not so great as the proportions of some of the other bones would indicate.

	M.
Length "No. VI." (16 inches)	0.510
Width at head	.140
" of "	.040
" at middle	.055
" at extremity	.040
Length "No. II."	.390
Width " just below the head	.100
" at middle	.037
Length "No. IX."	.380
" proximal to head	.060
Width at middle	.08

In the rib "No. II." the head is turned obliquely to one side, indicating that the rib diverged at a strong angle from the vertebral column, in fact not more than one of 45°. This is then an interior or posterior rib, probably the latter, since the shell is usually expanded chiefly in that direction. All the ribs are flat above, and convex inferiorly.

Both sides of the *scapular arch* are complete, except the sutural portions of coracoid and scapula of one side. The scapula and procoracoid make a very open angle with each other, both being stout; the scapula the longer, with grooved sculpture at its proximal end. The procoracoid is a little the shorter. The glenoid cavity and coracoid suture are almost sessile at the union of the scapula and procoracoid. The coracoids are very elongate, almost equal to the ribs, and not stouter except at the extremity. It is expanded into an oblique head proximally; the shaft is flat, one edge thickened or truncated, the other thin. The distal portion is scarcely expanded, being more slender than in any recent Testudinate known to me.

	M.
Length scapula to glenoid cavity	0.213
Width " proximally	.045
Length procoracoid to articular surface	.106
Width " distally	.060
Length coracoid	.400
Width proximally	.086
" medially	.047
" distally	.080

The elongate coracoid resembles most, among recent Chelonians, the marine genus *Chelone*, while the sessile glenoid cavity and short procoracoid with open angle are entirely different. In these points this genus is more like terrestrial forms as *Testudo*, or less like *Emys*.

Both *humeri* are entirely preserved. They appear to have been somewhat flattened by pressure ; but when unaltered they were no doubt flat, with stout proportions. They have a globular head with an immense trochanter which projects much beyond it proximally. The shaft is there much contracted, and expands again distally to the broad and very convex articular extremity. Opposite the narrow part of the shaft, the small trochanter appears on the inner side, forming an elongate ala. The long axis of the humerus is not straight, the proximal and distal portion making an angle of 110° with each other.

	M.
Total length humerus (1 ft.) straight	0.300
Length “ from head	.296
Width at head	.156
“ of “	.073
Least width shaft	.076
Greatest distal width	.132
Length basis little trochanter	.080
Thickness at shaft	.031

The flatness of this element and situation of the large trochanter in the general plane are characters of the *Sphargididæ* ; the great constriction medially and expansion of both extremities remind one of the *Mosasauroid* humerus.

Of bones of the fore arm there may be one, but the bones next in size to the humerus look more like metacarpals or metatarsals. Two of them were found together in position and their relative positions were not like those seen in the fore-arm of sea-turtles. They measure over seven inches in length, and are strongly concave on their adjacent sides. One of them is slightly concave on the outer side, the other convex, the convexity being at $\frac{2}{5}$ the length from one end. The ends of both are a little expanded and one end of one displays a double or trochlear extremity. The same end of the other is injured by pressure. A still larger metacarpal-like bone is relatively more expanded at the ends. The articular surface of one of these is wide at one end, and much narrowed at the other. The smaller bones, undoubtedly phalanges, are six in number. They are quite slender, a little expanded at the ends, and flat.

	M.
Length largest	0.165
Width do. at extremity	.065
“ “ middle	.032
Length longest of pair	.180
Width, extremity	.050
“ shaft	.027

	M.
Length phalange	.032
Width, extremity	.032
" shaft	.018
Thickness shaft	.011

These measurements indicate for the fore limb a total length of 4.52 feet (M. 1.347) if proportioned as in *Chelone;* this would give an expanse of 11.3 feet. If, however, it was constructed on the plan of *Sphargis*, the expanse would be nearly seventeen feet.

Several instructive *cranial bones* were preserved. These are the maxillary and distal part of the dentary of the left side ; the posterior part of the left mandibular ramus ; quadrate bones and adjacent pterygoids and squamosal, one side with the columellar plate also ; right post-orbital bone and part of the left. Also some probably hyoid elements.

The *maxillary bone* and dentary present a considerable extent of the alveolar margin. This is remarkable in being thin, sharp and elevated, without horizontal portion. The former bone is but little incurved to the premaxillary suture ; its anterior outline is elevated and vertical, the nostrils entering opposite the probable middle of the orbit. The palatal plate of the maxillary has no great antero-posterior extent, so that the inner nares are opposite the anterior part of the orbit. The latter presents only the anterior and inferior outlines in the specimen. The part of the maxillary below it is very narrow, and weaker than either *Sphargis* or *Chelone.* The cutting edge has a very open sigmoid flexure, suborbital part being turned inwards, the anterior part a little outwards. The osseous rim of the orbit projected considerably beyond the plane of the maxillary anteriorly.

The *dentary* bone is very deep anteriorly, and like the maxillary is a thin vertical lamina. The lower anterior angle is truncated by an acute concave margin. This is the anterior extremity of the symphysis. This suture occupies the inner face of a triangular area which extends but a short distance on the lower margin of the ramus, and then passes upwards and backwards for a short distance on the inner face of the ramus. That portion above the symphysis diverges outwards, thus producing a deep notch at the symphysis, as though designed to receive a beak-like projection of the premaxillaries. The cutting edge has a slight sigmoid flexure corresponding with that of the maxillary ; it rises into a projecting angle.

The posterior part of the ramus displays the cotylus, and in front of it a deep long fossa behind the articular bone. There is no angle nor coronoid bone, as in all marine turtles. The superior margin of the *dentary* is thicker posteriorly than in front, and its outer wall is produced backward as a thin lamina, covering the surangular almost to the posterior end of the ramus. The *angular* is, as in recent forms, a narrow wedge-shaped piece below the dentary and surangular. The posterior edge of the surangular projects behind the dentary and exhibits an acute convex edge rising forward. It supports a small part of the articular cotylus on its inner face. Most of this portion occupies the extremity of the *articular*. The latter sends a stout lamina obliquely upwards and forwards to the lower posterior part of the dentary.

The *quadrate bones* are of a peculiar form. They exhibit the usual posterior curviture above, with shallow funnel-like fossa for the tympanic cavity. It presents two strong ridges anteriorly, an inner and an outer which encloses a deep vertical concavity. The inner exhibits the suture with the pterygoid bone, the outer with the zygomatic. The superior border of the quadrate within the sqaumosal is massive and not inflated. Its surface is thickest where the usual articulation with the opisthotic exists. The posterior horizontal is short and deep. The transverse part of the bone which supports inferiorly the exterior part of the condyle is thin, and disappears above the antero-posterior portion. From its middle upwards it supports the *zygomatic*. The latter has no great extent anteriorly to its malar suture, and its inferior margin arches high above the line of the condyles of the quadrate.

The *pterygoid bones* are subtriangular in outline, with concave sides, an emarginate base, and a very obliquely truncate apex, which articulates low down on the quadrate bone. Both margins are thickened and rounded, the superior as boundary of the foramen ovale. The posterior margin of the plate-like columella overlaps it on the inner side, deeply notching it; on the outer side, the suture is zigzag and transverse. The superior part of the bone is produced like a flat rod, and at its end exhibits a squamosal suture for union with what is in the snapper a postero-inferior rod-like prolongation of the columella. No such process of the columella appears to exist in this species. The *columellar plate* is half as large as the pterygoid, and exhibits the oblique suture in front for the descending lamina of the parietal.

The *postfrontal* bone of the left side is preserved entire, and the inferior portion of that of the right. The inferior margin for the malar is the longest and is straight. The orbit is excavated in part from its anterior margin, while the supero-posterior is a continuous curve. The inferior suture is a groove, whose inner bounding wall is convex, but rises past the straight outer to an inner ridge, which probably approaches the eclopterygoid region. A large sutural face for the zygomatic exists at the tower posterior angle, and an elongate one above for the parietal. The inner face is concave, indicating a large temporal fossa as in *Sphargis* and *Chelone*.

Two bones of opposite sides of the cranium are either those portions of the pterygoids which bound the temporal fossa below in front, or those portions of the maxillary bounding the palatine foramen. As the free margin is much thickened they are probably the former. Their inner or thinner lamina is marked for squamosal suture with other bones, perhaps columella and palatine.

Measurements of Cranium.	M.
Depth premaxillary suture of maxillary	0.06
Length from do. suture to inner nares	.068

	M.
Depth maxillary below orbit	.035
“ dentary at symphysis	.078
“ notch of do. do	.044
“ dentary behind symphysis	.095
“ “ at coronoid region	.085
“ ramus at front of cotylus	.061
Length pterygoid fossa of do	.06
“ cotylus do	.07
“ postfrontal on inferior suture	.195
Depth “ at boundary of orbit	.136
Thickness “ lower suture	.019
Length from orbit (oblique)	.115
Length right quadrate	.140
Width (antero-posterior)	.110
“ of condyle	.064
Length right pterygoid superiorly	.155
Depth do. at inner columellar angle	.100
Length (oblique) of columella	.085

Restoration. Better materials exist for the restoration of this species than is usual in the case of most extinct *Testudinata.* The cranium was .50 M., or $24\frac{5}{8}$ inches in length. If the neck and carapace were related to it, as in the genus *Chelone,* the total would be as follows :

	Inches.
Cranium	$24\frac{5}{8}$
Neck and carapace	$138\frac{2}{8}$
Total 12.83 feet	$154\frac{7}{8}$

an extent not far from the expanse of the flippers above given, viz., 11.30 feet. The shortness of the cervical vertebræ indicate that the proportions of the neck were not dissimilar to those of the existing marine genera. The flippers were probably similar to the same ; of the hind limbs nothing can now be stated. The shortness of most of the ribs considered in connection with the length of the carapace, is remarkable. Thus the longest rib measures .51 M. or 16 inches ; width of lateral marginal beyond apex of rib 2.25 inches ; width of vertebra 3 inches, which is, however, covered by the expansion of the rib, included in this case in the length 16 inches. Total width of carapace at middle, $36\frac{1}{2}$ inches. Length of carapace 118 inches ; or wide 3 feet $\frac{1}{2}$ inch ; length 9 feet 10 inches. This outline, three times as long as wide, is justified in measure by the size, especially the lengths, of the marginals, which if placed end to end, would measure on one side of eleven pieces, if each were as long as the median, 8.5 inches × 11 = 7.8 feet. Some of the posterior marginals are shorter than 8.5 inches, while some of the anterior appear to be longer. The length 8.5 may then be taken as an average. But they formed the circumference of an open arc, so the axial length of the carapace should be placed at a lower figure than the above. This proposition may be offsetted by the fact that the marginals were not united to each other and exhibit no indications of contact. The length of 7.8 feet, for the carapace is not then too much, and estimating from the size of the head is too little. We can then safely conclude that the carapace of this turtle is more elongate and narrowed than existing forms. Thus in *Chelone mydas* the carapace is six-eighths as wide as long.

It remains to discuss the question of the age of the specimen. It might be objected that the absence of carapace, and the radiate character of the margins of many of the bones indicate that our type specimen is young. To this it may be replied (1), that it is in the (?) sternal bones unlike the young of any known type, when certain of their bodies do at all times exhibit smooth margins as boundaries of the points of exit of the limbs; moreover, it is possible that these plates were dorsal. (2) The superior or inner extension of the marginals exceed that of any known tortoise in the adult condition. (3) The articular bone is ossified. (4) Separate ribs should be discovered among extinct tortoises as an adult character, on theoretical grounds, the more as it exists in one recent genus (*Sphargis*, vide Wagler).

Affinities. In discussing these, one point heretofore left doubtful may be first considered. The large flat elements described as lateral dermal bones; are they ossifications of the dorsal or ventral integument? They were found below all the other bones, and nearly all the ribs laid on them with their heads turned upwards. This rendered it probable that the shields were dorsal, and that the animal was entombed on its back, and a coracoid, which was afterwards found lying immediately on the largest bone (No. 10), crossed in its course parts of two ribs. This could not have been the case had the shields been ventral. An examination of the shields does not reveal any conformity to any known type of Testudinate plastron. The bones radiate in all directions, leaving no margins for fore and hind limbs, or for a median fontanelle, still less for suture with each other.

Should these bones then be regarded as dorsal, they constitute a character not previously noticed in the order, but one whose homologue is seen probably in the dermal shield of bony tesselated plates seen in *Sphargis*. The other points of affinity to *Sphargis* are the distinct ribs; the thin laminiform jaws with cutting edges; the quadrate bone with such a strong anterior concavity; the elevated position of the zygomatic bone; the form of the humerus. Points of special resemblance to *Chelone* are: the short posterior superior portion of the quadrate; the entire edge of the maxillary bone; the deep dentary. The points in which it differs from both, are numerous. They are: the dorsal shields, the marginals, the notched symphysis, etc.; the shortened articular end of scapula; the elongate form of the carapace, etc.

The constant separation of the ribs, and the short vertebræ, are characters which are more like those possessed by other reptiles, than those characteristic of *Testudinata*. The presence of dermal dorsal bones is of the same kind. The genus *Protostega* then belongs near the *Sphargididæ* in the suborder *Athecæ*, and is in some points to be approximated to the *Chelonididæ*.

Distribution. This fossil was found near Ft. Wallace, W. Kansas. It was entirely recovered by excavating. The edges of one of the large bony shields were seen projecting from a bluff near Butte Creek, and was followed into the chalk rock with pick-axe and shovel with the result already indicated. The large bones were exposed in an entire condition, but were much fractured in the attempt to lift them from their bed. Though carefully packed, the transport of 1500 miles still further injured them, and the portions described were reconstructed of over 800 pieces by myself. One of the bony plates was broken into 108 pieces, the ribs into 183, the marginals into 146, etc.

This species may be called *Protostega gigas*, Cope.* A second species appears to have existed during the Cretaceous period, as indicated by a humerus from near Columbus, Miss., sent by Dr. Spillman to the Academy of Natural Sciences. With it were received bones of the Mosasauroid *Platecarpus tympaniticus*, and Dr. Leidy, who described them,† regarded all as belonging to one animal. On this basis he expressed the opinion that the fore limbs of the *Pythonomorpha* were natatory. That this view was correct I proved by study of the skeleton of *Clidastes propython*, and it now appears that the fore limbs of the latter were the first ever described.

The humerus of the Mississippi *Protostega* (see Leidy, l. c., Pl. viii., Fig. 1–2) is more elongate than that of the *P. gigas*, and is less contracted medially. The (great trochanter or) deltoid crest is longer and stouter, and the process answering to the little trochanter is more prominent, rounded, and proximal in position. It indicates a rather smaller animal than the Kansas specimen, and may be named *Platecarpus tuberosus.*

A third species is represented by a humerus found in the cretaceous green-sand of New Jersey. It was a huge animal, exceeding not only the species just described, but even the Indian *Colossochelys atlas.* usually regarded as the largest of the order. It was regarded by Leidy as pertaining "to the great *Mosasaurus*," but Agassiz regarded it as Chelonian in affinities, naming it *Atlantochelys mortonii.*‡ Its great trochanter is very prominent, as in *P. tuberosus*, but the lesser one is smaller and nearer the condyle or head. The shaft is still more slender and not flattened, but subcylindric. It may be called *Protostega neptunia.* It is figured by Leidy, l. c. Pl. viii. fig. 3, 4. In this connection may be recalled the vertebræ of a gigantic animal from the New Jersey Cretaceous, described by the writer as belonging to an extinct species and genus under the name of *Pneumatarthrus peloreus.* It is quite likely that these belonged to a turtle still larger than the *Protostega neptunia.* (See Proceed. Amer. Philos. Soc., 1870, p. 446.)

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*Proceed. Amer. Philos. Soc. 1871, p. 173.

† Cretaceous Reptiles of North America, p. 42. Smithson, Contrib. 1864.

‡ This name was unaccompanied with the necessary description, and is hence useless to science,